

Appl. No. 10/650,601
Amdt. dated 07/21/2005
Reply to Office Action of 04/25/2005

Attorney Docket No.: TS01-999
N1085-90151

REMARKS/ARGUMENTS

Claims 1-20 were previously pending in this application with claims 19 and 20 withdrawn from consideration. In the present Office Action, claims 12-18 were objected to and claims 1-11 rejected. Claims 1, 2, 7 and 9-12 are hereby amended. Applicants
5 respectfully request re-examination and reconsideration of claims 1-11 and allowance of each of presently pending claims 1-18.

I. Allowable Subject Matter

Applicants thank the Examiner for indicating, in paragraph 13 of the Office Action, that claims 12-18 are allowed.

10 II. Claim Objections

In paragraph 1 of the Office Action, claims 2, 7, 11 and 12-18 were objected to due to informalities. These informalities have been corrected and therefore the objection to claims 2, 7, 11 and 12-18 should be withdrawn.

The Examiner pointed out particular informalities with regard to claims 2, 7, 11
15 and 12. Applicants have addressed and corrected each of these informalities. Applicants would like to point out, however, that instead of using the Examiner's suggested amendments for claims 2, 7, 11 and 12, these particular informalities were corrected by amending the aforementioned claims in a manner slightly different than suggested by the Examiner. Applicants respectfully submit that, since the informalities
20 have now been corrected, the objection to claims 2, 7, 11 and 12 should be withdrawn as should be the objection to claims 13-18 which were objected to only due to their dependency on claim 12.

III. Claim Rejections under 35 U.S.C. § 112

In paragraph 3 of the Office Action, claims 1-11 were rejected under 35 U.S.C.
25 § 112, second paragraph, as being indefinite. Applicants respectfully submit that these claim rejections are overcome for reasons set forth below.

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In paragraph 4 of the Office Action, claim 1 was rejected due to the limitation "said isolated silicon islands" in line 11 which did not include sufficient antecedent basis as originally filed. Claim 1 has been amended and now complies with the antecedent basis requirements of 35 U.S.C. § 112.

5 In paragraph 5 of the Office Action, claims 2 and 3 were rejected for indefiniteness. Responsive to this rejection, claim 2 has been amended and claims 2-3 now comply with the requirements of 35 U.S.C. § 112, second paragraph.

10 In paragraph 6 of the Office Action, claim 10 was rejected due to the limitation of "said thermal oxide" in line 2, but Applicants believe this pertains to claim 11. Claim 11 has been amended to remove this limitation and now complies with the requirements of 35 U.S.C. § 112, second paragraph. In paragraph 7 of the Office Action, claim 11 was rejected for reciting the limitation "said isolating silicon dioxide layer" in line 2, but Applicants believe that this rejection applies to claim 10. Claim 9 has been amended to provide sufficient antecedent basis for the limitations of claim 10, which has also been
15 amended and now complies with the requirements of 35 U.S.C. § 112, second paragraph.

Claims 4-9 were rejected under 35 U.S.C. § 112 only due to their dependency on claim 1. For reasons set forth above, each of claims 1-11 now complies with the requirements of 35 U.S.C. § 112, second paragraph and the rejection of these claims
20 under 35 U.S.C. § 112, second paragraph, should therefore be withdrawn.

IV. Rejection of Claims 1-3, 6, 9 and 11 under 35 U.S.C. § 103

In paragraph 10 of the Office Action, claims 1-3, 6-9 and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chen, et al. (U.S. Pat. No. 5, 130,268) in view of Lin, et al. (U.S. Pat. No. 6,436,791 B1). Applicants respectfully believe that the
25 Chen reference referred to in the Office action, is in fact U.S. Pat. No. 5,110,755 as referred to on the PTO-892 accompanying the Office Action. Applicants respectfully submit that these claim rejections are overcome for reasons set forth below.

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Since the features described by the Examiner in the Office Action are consistent with the Chen et al. reference being USP 5,110,755, the following remarks are based upon the Chen et al. reference being the '755 patent.

Amended independent claim 1 recites the features of:

- 5 forming a trench pattern on a semiconductor substrate;
 forming a heavily doped p⁺ layer around said trench pattern.

Chen, et al. does not teach forming a heavily doped p⁺ layer around the trench pattern. With respect to the Chen, et al. reference, the Examiner correctly identifies
10 feature 15 of FIG. 1B as the trench. The Examiner then alleges that layer 19 satisfies the limitation of the claimed p⁺ layer that is formed around the trench. Applicants respectfully disagree and point out that Chen, et al. recites "a doped layer 19 and 21 of material is formed over the surface 16 of the recess 15," col. 4, l. 49-50. Doped layer 19 is clearly formed inside original trench 15, not around it. This is clearly shown in FIG.
15 1C of Chen et al. In Chen et al., the addition of the doped layer comes at the expense of the size of the trench opening and restricts the size of any features subsequently formed in the trench. While it may be true that, after film 19 is formed, it then surrounds the remaining trench of reduced size, Applicants respectfully point out that claim 1 recites forming a heavily doped buried p⁺ layer around said trench pattern, which
20 refers back to the originally defined trench pattern. Since the claimed buried p⁺ layer is necessarily formed around the original trench, claim 1 is distinguished from Chen, et al. because Chen's doped layer 19 is not around the original trench 15. Amended independent claim 1 is therefore distinguished from Chen, et al.

The cited reference of Lin, et al. has apparently been relied upon for providing an
25 oxide layer in (not around) a trench and does not make up for the above-stated deficiencies of Chen, et al. Claim 1 is therefore distinguished from Chen, et al. in view of Lin, et al., taken alone or in combination. The rejection of claim 1 under 35 U.S.C. § 103(a) as being unpatentable over Chen, et al. in view of Lin, et al., should therefore be withdrawn.

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Since claims 2, 3, 6, 9 and 11 depend directly from independent claim 1, claims 2, 3, 6, 9 and 11 are also distinguished from the references of Chen et al. and Lin et al. and the rejection of these claims under 35 U.S.C. 103(a), should also be withdrawn.

V. Rejection of Claims 4-5, 8 and 10 under 35 U.S.C. § 103

5 In paragraph 11 of the Office Action, claims 4-5, 8 and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chen, et al. (as above – believed to be USP 5,110,755) in view of Lin, et al. (as above) and further in view of Lin, et al. (U.S. Pat. No. 5,950,094), hereinafter "Lin '094". Applicants respectfully submit that these claim rejections are overcome for reasons set forth below.

10 Claims 4-5, 8 and 10 depend from claim 1 which is distinguished from the references of Chen, et al. in view of Lin, et al., for reasons set forth above. The reference of Lin '094 has apparently been relied upon for providing boron ion dosage parameters, particular oxide thicknesses and particular characteristics of the etching bath. Lin '094 therefore does not make up for the above-stated deficiencies of Chen, et al. in view of Lin, et al. Therefore, claims 4-5, 8 and 10 are distinguished from the
15 references of Chen, et al. in view of Lin, et al. and further in view of Lin '094. As such, the rejection of claims 4-5, 8 and 10 under 35 U.S.C. § 103(a) should be withdrawn.

VI. Rejection of Claim 7 under 35 U.S.C. § 103

In paragraph 12 of the Office Action, claim 7 was rejected under 35 U.S.C.
20 § 103(a) as being unpatentable over Chen, et al. (as above) in view of Lin, et al. and in further in view of Wolf, Silicon Processing for the VLSI Era, Vol. I, pp. 156-157. Applicants respectfully submit that this claim rejection is overcome for reasons set forth below.

Claim 7 is a dependent claim that depends from amended independent claim 1
25 which is distinguished from the references of Chen, et al. and Lin, et al. for reasons set forth above. The reference of Wolf has apparently been relied upon to establish that it is well known in the art to form an epitaxial silicon layer by MBE. Wolf therefore does

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not make up for the above-stated deficiencies of Chen, et al. and Wolf also does not make up for the above-stated deficiencies of Chen, et al. in view of Lin, et al. and therefore claim 7 is distinguished from the references of Chen, et al., Lin, et al., and Wolf, taken alone or in combination. As such, the rejection of claim 7 under 35 U.S.C. § 103(a) should be withdrawn.

CONCLUSION

Based on the foregoing, each of pending claims 1-18 is in allowable form and the application in condition for allowance, which action is respectfully and expeditiously requested.

The Assistant Commissioner for Patents is hereby authorized to charge any additional fees or credit any excess payment that may be associated with this communication to deposit account 04-1679.

Respectfully submitted,

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